Teachers Guide to the Forest Hike

Goals

1. Students will enjoy the Oregon Caves above ground.
2. Students will demonstrate positive stewardship.
3. Students will assess the relationship between the cave and the forest.
4. Students will understand the rock cycle.
5. Students will understand the speleogenesis of the Oregon Caves.

How to use this guide

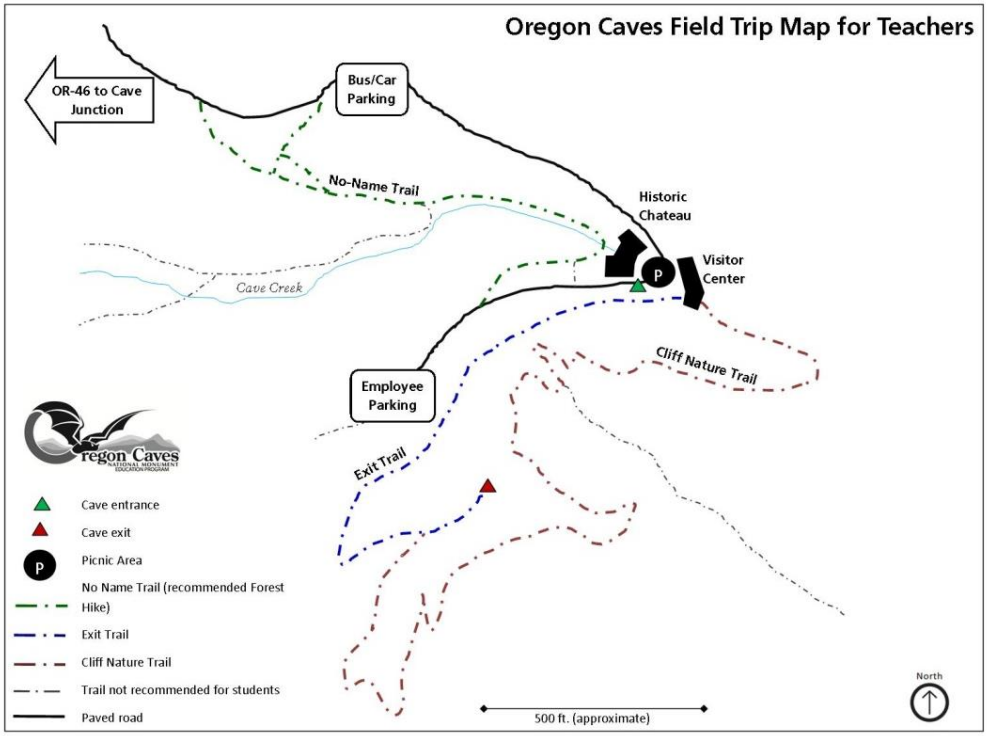
Thank you for taking your students on this forest hike! This guide was designed to equip teachers, chaperones, and other leaders with information and activities that can turn the No-Name Trail into a standards-based educational experience (don't worry, we left room for fun!). This guides leaders through five activities that can be conducted along the trail. Each activity includes a suggested location on the trail, a script, questions for checking comprehension, and some background information. It is appropriate to use for both north- and south-bound hikes.

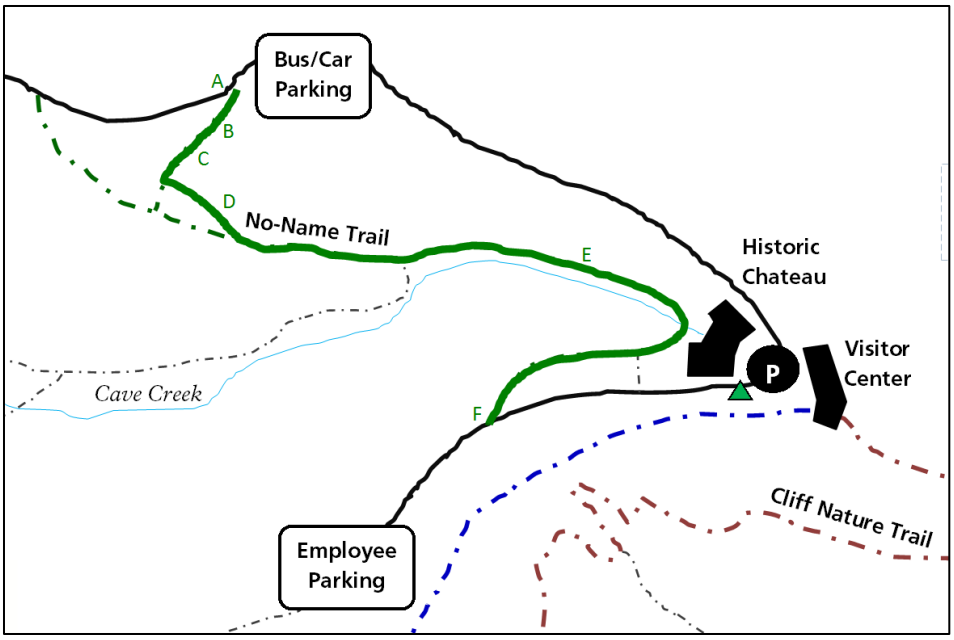
- If you are hiking from the lower (bus) parking lot, begin with the first activity.

- If you are hiking from the picnic tables or upper parking lot, begin with the last activity and work your way backward through this packet.

If challenging questions come up during your discussions, feel free to ask a ranger once you have finished your hike.

Enjoy the No-Name Trail!





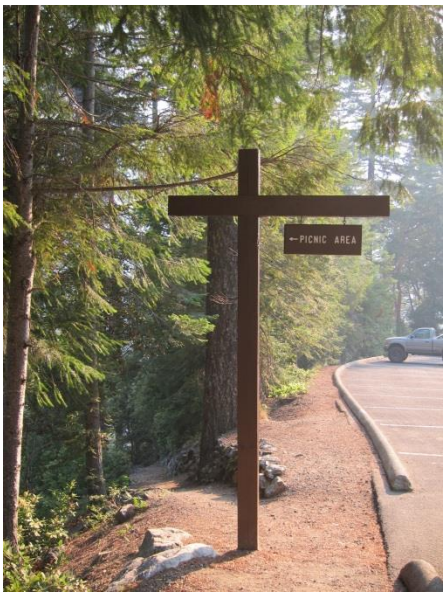
Route

This hike follows a portion of the No-Name Trail; the recommended route is highlighted in green on the subset map and suggested stops are labeled by letters.

Groups who hike before touring the cave will begin at the "Picnic Area" sign in the bus parking lot and hike southbound to the employee parking lot/picnic area, where they will eat lunch and meet rangers for their cave tour.

Groups who hike after touring the cave and eating lunch will begin at the trailhead in the employee parking lot and hike northbound to the bus parking lot.

A. Trailhead: *Practicing "Leave No Trace" Ethics*



Trailhead in bus parking lot for southbound hike

Goal: *Students will demonstrate positive stewardship.*

Explain to students:

- We will be hiking a quarter mile through National Park Service land. The mission of the National Park Service is to provide people with the opportunity to enjoy resources without harming those resources.
- During this hike you should take responsibility for keeping yourself safe AND for keeping the land around you safe. You can do this by practicing "Leave No Trace" (LNT) ethics.

Ask students:

- What does "Leave No Trace" mean?

Activity:

Go down the line of students and have them each state one thing they can do or nor not do in order to leave no trace on this hike. Below are LNT principles that should be covered, either by the teacher or by students. Throughout the hike, encourage students to complement each other when they see their classmates leaving no trace. This activity can be brought back to the classroom and used on other field trips.

-Travel only on established trails.
-Walk single file in the middle of the trail, even when wet or muddy.
-Pack out all trash, including food.
-Leave rocks, plants, and other natural objects as you find them.
-Observe wildlife from a distance.
-Never feed animals. Feeding wildlife damages their health, alters natural behaviors, and exposes them to predators and other dangers.
-Let nature's sounds prevail. Avoid loud voices and noises.

Teacher resources:

- Leave No Trace principles are good manners in the wilderness and are often the law on NPS land and other lands managed for conservation.
- You can learn more about LNT at the website http://www.lnt.org

B.Picnic Tables: *What's in a rock?*

Goal: Students will observe rocks with and lenses and build a foundation for understanding the rock cycle.

Picnic tables on the No-Name Trail

Materials:

- Hand lenses (kept in small treasure box under the first picnic table)

Students may sit at the picnic tables. Ask students:

- What makes a rock a rock?

After answers/discussion, explain:

- A **rock** is a solid, naturally occurring composition of minerals.
- A **mineral** is a solid, naturally occurring, inorganic (never living) mix of chemical elements with an ordered atomic arrangement (these arrangements are responsible for crystal structures).
- One rock might contain one, two, or many different minerals. Different minerals are why rocks sometimes appear speckled or differently colored.

Activity:

Students will have a few moments to use hand lenses to freely explore the rocks along the trail and that make up the steps and picnic tables. First show students how to use a hand lens. Hand lenses are not the same thing as magnifying glasses; they are used to achieve high magnification of a very small area. They are similar to microscopes in that the user must "focus" them by bringing her eye close to the lens and bringing the lens close to the object. Demonstrate, then pass out hand lenses and have students practice focusing on their thumbs before they focus on rocks.

Have students count how many different colors they find in their rocks. Do the rocks seem to be made up of many different kinds of minerals, or just one or two?

Teacher resources:
Most of the rocks found in this area are metamorphic marble or igneous diorite. Marble contains primarily the minerals calcite (white), graphite (grey), and some silica (whitish). Diorite contains plagioclase (white-grey), horneblende (dark green-black), and pyroxene (dark green-brown-black).

C. Tree Roots: *What's the world made of?*

Goal: Students will assess the relationship between the cave and the forest and build on their understanding of the rock cycle.

Tree roots with marble chunks

Ask the students the following questions and encourage discussion:

- What would the world look like without plants?
- What would the world look like without rocks?
- How do you think plants and rocks might need each other?

Make sure all students can see the upended tree roots holding chunks of rocks. Explain:

- The rocks stuck in these roots are natural, and the tree fell over from natural causes (most likely wind). This shows a relationship between plants and rocks:
    - Plants don't just grow in thin air; they need a surface to grow on and minerals to help them grow. Rocks provide these minerals, but in order to make a good surface, they must be broken up (weathered).
    - Plants can help weather rocks with the power of roots. Have you ever seen a plant growing through a crack in a sidewalk? Roots are often what cause sidewalks to crack.
    - After roots break up rocks into chunks, the rocks can be more easily weathered by other forces such as wind and water. Eventually, the rocks will weather into sand or sediment.
    - Sediment gets mixed with dead plant leaves, twigs, and micro-organisms to create soil. Without soil, it would be hard to have plant life, but without rocks and minerals, plants would not have a place to live.

Teacher resources:
Plants use the following minerals found in the soil: nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur. If one or more of these minerals is lacking in the soil it will affect the plant community. Certain species are more sensitive than others to mineral composition. In the Illinois River Valley, the "carnivorous" cobra lily (*Darlingtonia californica*) has adapted to poor mineral conditions by teaming up with bacteria to digest nutrients from bugs that get caught in its tubular leaves!

D. Clearing: *The Rock Cycle*

Goal: Students will understand the rock cycle and learn the terms *erosion* and *weathering*.

Clearing on the No-Name Trail

Materials (found in treasure box):

- Rock samples
- Laminated images of rock cycle stages
- Sedimentator

Students can stand it a circle to facilitate passing rock samples. Ask:

- All rocks are in a constant state of change; what do you think is powerful enough to change rocks? *Cover forces such as temperature, pressure, weathering from wind and rain, human activity, volcanism, etc.*

Explain:

- Rocks are grouped into three "families" based on the last change they went through.
- Igneous rocks have undergone cooling. These rocks were once magma. When magma cools it can turn in to many different kinds of rocks like basalt, obsidian, pumice, or the diorite that is in the cave. *Show laminated volcano image and pass around obsidian, pumice, and diorite samples.*
- Eventually these rocks can become weathered. Look down on the ground and you can find sand and small pebbles. These were once part of larger rocks that have been weathered, or broken down into smaller pieces.
- When these small, weathered pieces of rock are moved, we call the process erosion. Wind, rain, and foot traffic can cause erosion. Tree roots and moisture in the soil can prevent erosion.

Have the students get on their knees and feel the ground. Is it dry or moist? Have the students look around – are tree roots under their feet? Ask the students if they think this soil will be eroded easily or if it is stable. Explain:

- Sometimes weathered material can become compressed and turn into a new rock. Some minerals such as calcite can "cement" the weathered material together. *Shake the sedimentator and allow students to watch as the sand settles.*
- Sedimentary rocks have undergone the weathering-and-cementing process. *Pass around limestone and calcite samples.*
- Finally, metamorphic rocks have undergone change from heat and pressure. If an igneous or sedimentary rock gets buried deep underground, the pressure of earth from above plus the heat from the mantle can change the rock. The cave is made out of marble, a metamorphic rock that used to be limestone until it was subducted and metamorphosed. *Pass around the marble sample.*
- Sometimes a rock can change in a way that doesn't allow it to fit into these categories. Our state "rock" is actually a mysterious geologic structure called a thunderegg. *Pass around the thunderegg*. These structures form in igneous rock, but scientists are unsure of the process that causes the beautiful agate structures to form inside.

E. Cave Creek: The Aquatic Connection

Goal: Students will understand the speleogenesis of the Oregon Caves and enjoy the forest above the caves.

Materials: None

Activity: Sit Spot (if time and weather permit)
To allow students to rest and experience the creek without peer distractions, give the following instructions:

- You are going to have a few minutes to sit quietly and enjoy the woods around. Take this time to listen to the creek, think, or rest, but *do not* talk to your neighbors. Sit in a comfortable place and try not to move around too much.
- Find a place *on the trail* at least three feet from another person.

Caves Creek: the left channel is water that runs through the Chateau dining room. The right channel is diverted away from the Chateau via a culvert and rejoins the creek here along the No-Name Trail.

Held the students spread out and encourage each child to sit, not stand. To avoid distractions, the leader is encouraged to participate in this activity as well! Suggested sit time is 2-5 minutes. Afterwards, ask students:

- What did you hear, feel, see, or smell?
- How is being quiet and still in the woods unlike talking and moving around?

Try to bring the conversation to water (inevitably, a student will say they heard the creek!).
Explain:

- This creek runs through the forest high on the mountain, disappears into the cave, and reappears to flow down the mountain. If you were a fish and we dropped you in the water right here, you could swim all the way to the Pacific Ocean without running in to a single dam – something rare for this area.

Ask:

- How does this stream change the rock underground? *Focus on erosion, or the force of water moving sediment; the stream can wash rocks out of the cave.*
- How does this stream change the rock aboveground? *Focus on weathering, or polishing/grinding down rocks into smaller pebbles.*

Explain:

- Water also enters the cave in the form of precipitation. Rain and melted snow trickle through the soil and pick up carbon dioxide from plants; remember, plants “breathe” CO2 like we breathe oxygen. Carbon dioxide turns the water into carbonic acid.
- Acids are good at breaking down or weathering other materials; that’s why your stomach contains acid (it breaks down your food). Carbonic acid can weather some

rocks, including limestone and marble, but it takes a long time. This weathering is how the cave began to form.

Students will be familiar with the role of carbonic acid in speleogenesis if they received a classroom visit or if they took a cave tour before the hike; otherwise, their ranger will demonstrate the fizzing effect of putting acid on calcareous rock.

In conclusion, ask the students:

- How are the cave, the forest, and the water in this ecosystem connected? What would one be like without the other?

F. Trailhead: Exit for southbound hikes, entrance for northbound

Please use the trailhead that is in the Employee Lot (lower parking lot). The trailhead is on the downslope side of the lot; look for a sign marked "No-Name Trail." It is *not* the trailhead by the Chateau marked "Employees Only." If you walk all the way through the parking lot and come across a garage-like building, you have gone too far.

Northbound hikes should cover "Leave No Trace" ethics before beginning the hike; see Activity A. From this point, you may proceed with the activities by reading this guide backwards.

Lunchtime at the Picnic Tables

- Please remind students to continue "Leave No Trace" ethics while they are eating. Have students pick up trash before leaving the picnic area.
- Restrooms are located in the Visitor Center breezeway behind the display signs.
- Trash and recycling are available.
- Please do not allow students to sit on the rock ledge; we don't want anyone to fall into the pond!